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SOME EARLY TERTIARY MICROPLANKTON AND POLLEN GRAINS FROM A DEPOSIT NEAR STRAHAN, WESTERN TASMANIA

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Abstract

Four new species of microplankton are described and seven species recorded from a Lower Tertiary deposit in western Tasmania. A few of the associated pollen types are figured and identified. The age of the deposit is discussed.

Introduction

The sample examined, T27, was collected by Esso Exploration Australia, Inc. from the basal 15 ft ± sandstone of a road cutting at the head of Long Bay, about 800 ft W of the Post Office at Strahan, western Tasmania. This sample consists mainly of a fine-grained sandstone, whitish in surface view, pale to dark brown when broken across, the depth of the colour depending upon the amount of the contained cuticular fragments and plant micro-fossils. Among this fine-grained material a few small, white, rounded, coarser-grained pieces bearing small quartz fragments attracted attention. Subsequent treatment of some of these revealed such an exceptionally high microplankton content that further investigation was almost entirely restricted to this type of matrix.

The holotypes and hypotypes are in the palaeontological collection of the National Museum of Victoria. Numbers prefaced by the letter P are registered numbers in that collection.

Systematic Descriptions

1. MICROPLANKTON (I.C.C. & A.E.)

Class DINOPHYCEAE

Family DEFLANDREACEAE

Genus **Wetzeliella Eisenack** 1938

Wetzeliella lineidentata Deflandre & Cookson 1955

(Pl. 17, fig. 1, P24732)

Wetzeliella lineidentata Deflandre & Cookson 1955, p. 253, Fig. 17, 18; Pl. 5, fig. 5.
Wetzeliella lineidentata Deflandre & Cookson, Cookson & Eisenack 1961, Pl. 1, fig. 7.

COMMENT: The specimen illustrated, the only one of its kind recovered from the Esso sample T27, appears to be close in most respects to the type from the Lower Tertiary deposit near Denmark, Western Australia, and those recorded by Cookson & Eisenack (1961) from deposits in the Rottnest Island Bore, Western Australia, between 1480-1541 ft and 1575-1595 ft. The main differences are the sparsely toothed character of the margins of the Strahan example and the inconspieuousness of the 'rather prominent teeth' which delimit distinct fields in typical examples, especially the one from the Rottnest Bore illustrated by Cookson & Eisenack.

DIMENSIONS: *c.* 157 μ long, *c.* 152 μ broad, eapsule 72 × 76 μ.

Wetzeliella cf. **lineidentata** Deflandre & Cookson 1955

(Pl. 17, fig. 2, Fig. 1, P24733)

COMMENT: A single specimen which, while showing some of the characters of *W. lineidentata*, possesses others which appear to distinguish it from that species, has been recovered from the Esso sample T27. However, until more examples are found, a comparison rather than a direct association with *W. lineidentata* seems the more advisable proeedure. The main features in which this specimen deviates from *W. lineidentata* are the stronger development of both apical and antapical horns, the development of only one antapical projeetion, the untoothed character of the margins and the presenee of lines of prominent thiekenings adjacent to the margins, on the edges of the girdle and, on the ventral surface, running obliquely from the ends of the girdle, upwards and downwards, towards the lateral margins.

DIMENSIONS: *c.* 172 μ long, 141 μ broad, incomplete, eapsule 71 × 78 μ.

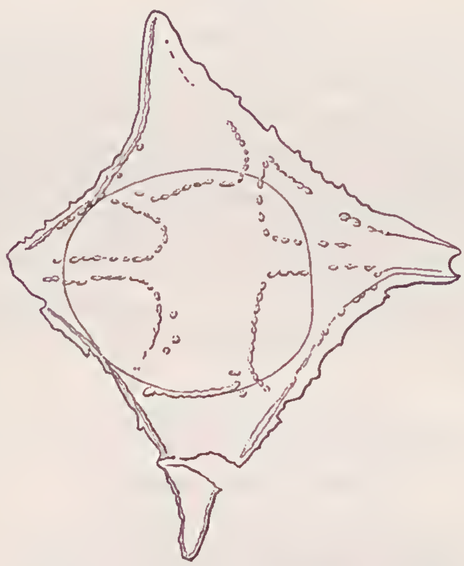

FIG. 1—*Wetzeliella* cf. lineidentata, c. 400 ×. Ventral surface, showing lines of thickenings.

Wetzeliella cf. **articulata** Eisenaek 1938

(Pl. 17, fig. 3, 4, P24734, 24735)

Wetzeliella articulata Eisenack 1938, p. 70, Fig. 4.
Wetzeliella articulata Eisenack & Cookson 1956, p. 185, Pl. 2, fig. 6.

COMMENT: Two of the Strahan examples referable to *Wetzeliella* agree in shape and general form with specimens of *W. articulata* from the Upper Eoeene loeality in

East Prussia. Both, however, differ from this species in the much sparser distribution of the appendages and their more broadly based characters. They also appear to be distinct from the specimen from the Victorian Dartmoor Formation referred by Cookson (1956) to *W. articulata*. More examples will be needed for the specific identification of such forms.

DIMENSIONS: Complete specimen *c.* 166 μ long, 138 μ broad; capsule 104 × 90 μ.

Wetzeliella homomorpha Deflandre & Cookson 1955

(Pl. 17, fig. 5, 6, P24736, P24737)

Wetzeliella homomorpha Deflandre & Cookson 1955, p. 254, Pl. 5, fig. 14, Fig. 17, 18.

COMMENT: Specimens which agree reasonably well with the examples of *W. homomorpha* from the type locality, the Upper Paleocene, Princetown Member of the Dilwyn Clay, Victoria, in size, shape, nature of the appendages, absence or inconspicuousness of the horns and the apparent absence of an internal body have been of regular occurrence in the Esso sample T27. However, evidence of an internal capsule and a circular to polygonal archeopyle, not previously recorded for this species, is present in the two figured examples.

DIMENSIONS: Overall length *c.* 76-104 μ, breadth *c.* 68-108 μ; shell *c.* 56-96 μ long, *c.* 50-80 μ broad.

Family HYSTRICHOSPHAERIDIACEAE

Genus **Homotryblium** Davey & Williams 1966

Homotryblium tasmaniense n. sp.

(Pl. 20, fig. 1-11; holotype fig. 1, 2, P24727, paratype fig. 4, 5, P24729)

AGE and OCCURRENCE: Paleocene: Esso Exploration Australia, Inc. Sample T27, Strahan, Tasmania.

DESCRIPTION: Shell spherical, relatively thin-walled, two-layered, coarsely granular to spinulose, with radially arranged tubular appendages which are open distally and vary considerably both in length and width. Usually those of a single specimen are of approximately the same length, but their width may vary quite considerably. The wall of the shell in the vicinity of the points of insertion of the appendages is smooth to finely granular, so that the base of each appendage is surrounded by a narrow circular area that contrasts distinctly with the general surface of the shell.

The shell opens by the separation of the 5-, or more rarely, 6-sided plates, each with a centrally placed appendage, into which the wall of one half of the shell (apical) becomes subdivided, the total number, approximately seven or eight, depending on the number of appendages originally present. These plates eventually separate from one another, either individually or occasionally in groups, so that an archeopyle embracing the whole equatorial region is formed.

DIMENSIONS: Holotype—overall diameter *c.* 83 μ, shell *c.* 55 μ, appendages 12-18 μ, 2-8 μ wide, 'funnel' 13-15 μ wide. Range—overall diameter *c.* 76-95 μ, shell *c.* 48-57 μ, appendages *c.* 5-24 μ long, *c.* 2-10 μ wide.

COMMENT: The reference of the Tasmanian form to the recently created genus *Homotryblium* rather than to the genus *Hystrichosphaeridium*, as originally intended, is based mainly on the type of archeopyle. An examination of Ehrenberg's type specimen of *H. tubiferum*, kindly lent by the Geological Department of the Humboldt University, Berlin, showed it to be relatively small and distinctly circumscribed in contrast to that of the epitractal type which partly characterizes the genus *Homotryblium*.

Of the two species of *Homotryblium* at present established, *H. tenuispinosum* Davey & Williams 1966 from the London Clay seems to be the one to which *H. tasmaniense* most closely approaches. However it differs from the English species in the almost regular development of the smooth or very finely granular zones that surround the bases of the appendages and the complete separation of the sulcal plates. *H. tasmaniense* is very abundant in those of the Esso T27 matrices that are richest in microplankton.

Genus **Diphyes** Cookson 1965

Diphyes colligerum (Deflandre & Cookson) Cookson 1965

(Pl. 17, fig. 7, P24738)

non Hystrichosphaeridium sp. *c.* Cookson 1953, p. 155, Pl. 2, fig. 29, 30.
Hystrichosphaeridium colligerum Deflandre & Cookson 1955, p. 178, Pl. 7, fig. 3.
Hystrichosphaeridium colligerum Deflandre & Cookson, Cookson & Eisenack 1961, p. 42, Pl. 2, fig. 9.
Baltisphaeridium colligerum (Deflandre & Cookson) Downie & Sarjeant 1963, p. 91.
Diphyes colligerum Cookson 1965, p. 86, Pl. 2, fig. 29, 30.

COMMENT: Specimens referable to *D. colligerum* have occurred in low frequencies in the Strahan sample T27. The known range of this species in Victoria is a wide one (Cookson 1965), from Upper Cretaceous (probably Senonian) to Upper Eocene (Brown's Creek Greensand). *D. colligerum* has been recorded from a section of the Rottnest Island Bore, Western Australia (Cookson & Eisenack 1961, p. 42) which is believed to be of Paleocene age (Harris 1965, p. 100).

Genus **Cordosphaeridium** Eisenack 1963

Cordosphaeridium inodes (Klumpp) Eisenack 1963

(Pl. 19, fig. 12)

Hystrichosphaeridium inodes Klumpp 1953, p. 391, Pl. 18, figs. 1, 2.
Hystrichosphaeridium inodes Klumpp, Deflandre and Cookson 1955, p. 277, Pl. 8, fig. 7.
Hystrichosphaeridium inodes Klumpp, Gerlach 1961, p. 186, Pl. 28, figs. 4, 5.
Cordosphaeridium inodes (Klumpp) Eisenack 1963, p. 261, fig. 3.

COMMENT: Three examples which appear referable to *C. inodes* have been isolated from the Strahan sample T27. This species was recorded by Deflandre and Cookson in 1955 from two Victorian deposits, namely the Princetown Member of the Dilwyn Clay and the Birregurra Bore No. 1 at 760-761 and 959-960 ft, both of which are now classed as Paleocene (Harris 1965).

Family AREOLIGERACEAE

Genus **Cyclonephelium** Deflandre & Cookson 1955

Cyclonephelium variabile n. sp.

(Pl. 19, fig. 9-11; holotype fig. 9, P24749)

AGE AND OCCURRENCE: Paleocene: Esso Exploration Australia, Inc. Sample T27, Strahan, Tasmania.

DESCRIPTION: Open shell roughly spherical in outline, with or without a short, blunt antapical prominence towards one side and a variable number of simple or branched appendages which vary considerably in both length and width, and may be either free or united with neighbouring ones. The appendages are most numerous near the margins of the shell, and almost entirely absent from a narrow central area on one side of the shell.

The shell opens by the detachment of the apical portion along an almost straight line.

DIMENSIONS: Holotype—overall diameter *c.* 109 μ, shell *c.* 75 μ, appendages *c.* 20-34 μ long. Range—overall diameter *c.* 85-120 μ, shell *c.* 60-90 μ, appendages 10-38 μ long.

COMMENT: *C. variabile*, as the specific name suggests, is extremely variable, and the limits and even generic placing of some of the examples are difficult to assess. *C. variabile* is clearly distinct from *C. retintextum* Cookson 1965 from certain Victorian Upper Cretaceous (probably Senonian) deposits and particularly the Paleocene Pebble Point Formation, in which both surfaces have clearly defined unornamented areas and all the appendages are looped.

FAMILY UNCERTAIN

Genus **Spinidinium** Cookson & Eisenack 1962

Spinidinium essoi n. sp.

(Pl. 19, fig. 1-8; holotype, fig. 1, 2, P24753)

AGE AND OCCURRENCE: Paleocene: Esso Exploration Australia, Inc. Sample 27, Strahan, Tasmania.

DESCRIPTION: Shell small, somewhat flattened and oval in outline, with straight to convex sides, a relatively broad, circular, equatorial girdle with high ledges bearing short thin spines, a short blunt apical horn and a single sharply-pointed horn on the left-hand side of the antapex. Both surfaces of the shell are partially tabulated, the areas being delimited by short spines. On the ventral surface of the epitheca a small, roughly rectangular area outlined by small dot-like thickenings is usually clearly evident, and a relatively wide furrow-like region, delimited by small spines, is typically present in the hypotheca. An intercalary, trapezoidal archeopyle is developed on the dorsal surface of the epitheca.

In one specimen (Pl. 19, fig. 8) a relatively thin-walled cyst-like body, circular in outline, occupies approximately three-quarters of the cavity of the shell.

The wall of the shell, which is rather sparsely ornamented with pointed or knobbed spines, appears to consist of two closely opposed layers which separate from one another only at or near the bases of the horns, the position of the diaphragnum varying in individual specimens. The apical horn tends to be straight-sided and its apex incurved; the antapical horn, which tapers to a sharp point, bears a few downwardly directed spines.

DIMENSIONS: Holotype—overall length 60 μ, width 46 μ, girdle 5 μ wide. Range—overall length *c.* 50-62 μ, width 40-52 μ, spines up to *c.* 3 μ.

COMMENT: *S. essoi* differs from the Australian Cretaceous species *S. styloniferum* Cookson & Eisenack 1962 in the shape of the shell, the less numerous and finer spines, the presence of a simple form of tabulation and the shape of the archeopyle. It differs from the two American Paleocene species *S. densispinatum* and *S. microceratum* described by Stanley (1965) in the absence of a second antapical horn and, as far as can be judged from the illustrations of both species, the more regular and wider distribution of the spines.

Genus **Kenleyia** Cookson & Eisenack 1965

Kenleyia lophophora Cookson & Eisenack 1965

(Pl. 18, fig. 1-7, P24739-P24744)

Kenleyia lophophora Cookson & Eisenack 1965, p. 135, Pl. 5, fig. 7-10.

COMMENT: When the species *K. lophophora* was first described it was evident that a rather wide variation in the type and degree of fineness of the ornament and size and shape of the horns must be allowed for when future references to this species were being considered, a decision that, unfortunately, has been rendered more difficult by the unsatisfactory reproduction of the original illustrations. For these reasons we are illustrating several individual examples from the Strahan sample T27, which we feel may, with reasonable certainty, be associated with *K. lophophora* from the Dartmoor Formation in SW Victoria, an example of which is shown in Pl. 18, fig. 7.

Some of the Strahan examples differ from those of the Dartmoor Formation in (1) the more frequent absence of the 'tuft-like prominences' in the vicinity of the horns (Pl. 18, fig. 1, 7), (2) the greater variability in the length and shape of the horns, the apical horn sometimes being the longer of the two (Pl. 18, fig. 3) and (3) the degree of density and coarseness of the 'fibrilose' elements of the outer layer of the wall which, as in the two specimens shown in Pl. 18, fig. 4, 5, are sometimes relatively widely separated, broadly based and almost finely spine-like.

DIMENSIONS: Figured specimens *c.* 134-170 μ long, *c.* 82-123 μ broad.

INCERTAE SEDIS

Group ACRITARCHA Evitt

Sub-group SPHAEROMOPHITAE

Family LEIOSPHAERIDAE

Genus **Leiosphaeridia** Eisenack 1958

Leiosphaeridia trematophora n. sp.

(Pl. 19, fig. 13; holotype, fig. 13, P24752)

AGE AND OCCURRENCE: Paleocene: Esso Exploration Australia, Inc. Sample T27, Strahan, Tasmania; Upper Eocene: Brown's Creek, SW Victoria, carbonaceous clay above Greensand.

DESCRIPTION: Shell spherical, thin-walled, provided with a circular pylome, the rim of which is more or less thickened. A narrow, densely granular equatorial zone surrounds the shell.

DIMENSIONS: Holotype—*c.* 86 $\times$ 74 μ, pylome *c.* 16 μ. Range—including the Brown's Creek examples *c.* 74-120 μ, pylome 15-22 μ.

COMMENTS: The specimens from the Strahan deposit are slightly thinner-walled than those from Brown's Creek. All the examples have been flattened and somewhat folded; however, the circular outline suggests that, originally, they were spherical.

Most of the known species of *Leiosphaeridia* are from Ordovician and Silurian deposits. One species, *L. similis* Cookson & Eisenack (1960), which is clearly distinguishable from *L. trematophora*, has been recorded from several Upper Jurassic deposits in Western Australia.

SUB-GROUP UNCERTAIN

Genus **Epicephalopyxis** Deflandre 1935

Epicephalopyxis indentata Deflandre & Cookson 1955

Epicephalopyxis indentata Deflandre & Cookson 1955, p. 292, Pl. 9, fig. 5-7; Fig. 56.

COMMENT: *E. indentata* occurs abundantly in the Esso Sample T27 from Strahan, Tasmania. Unfortunately, however, no further light has been thrown on the nature and origin of this obscure form. In some specimens a fine median line crosses the flat surface.

Originally *E. indentata* was recorded from Victorian Paleocene deposits such as the Pebble Point Formation, the Upper part of the Dilwyn Clay, Nelson Bore at 3,894 ft and a few Lower Eocene deposits including one near Denmark, Western Australia.

E. indentata is so abundant in the Strahan sample, as well as in the SW Victorian deposits mentioned above, as to suggest the probability that it was a planktonic rather than an attached form as has been suggested for *E. adherens* from French Cretaceous flints (Deflandre 1935).

Conclusion

It is clear that the microplankton assemblage recovered from the Strahan sample T27 provides definite information regarding the age of the deposit from which it was collected. The occurrence of such forms as *Wetzeliella homomorpha*, previously recorded from the Upper Paleocene Princetown Member of the Dilwyn Clay, Victoria; *W. lineidentata*, from the Lower Tertiary of Western Australia; *Kenleyia lophophora*, from the Paleocene Dartmoor Formation, Victoria; *Epicephalopyxis identata*, from several Paleocene deposits in Victoria, including the Pebble Point Formation, and the pollen type *Monosulcites prominatus* (*Baltisphaeridium taylori* Cookson & Eisenack 1965) from two New Zealand Lower Tertiary deposits (see p. 137) and the Paleocene Dartmoor Formation, Victoria, indicates that the age of the Strahan deposit, under consideration, is probably Paleocene, and younger than the Pebble Point Formation.

The pollen content (p. 137), as far as it has been studied, supports the suggested Paleocene age.

2. POLLEN AND SPORE CONTENT (I.C.C.)

Genus **Monosulcites** Cookson 1947 ex Couper 1953

Monosulcites prominatus McIntyre 1965

Pl. 18, fig. 8-12, P. 24745-24748)

Monosulcites prominatus McIntyre 1965, p. 214, fig. 33, 34.
Baltisphaeridium taylori Cookson & Eisenack 1965, p. 137, Pl. 16, fig. 9, 10.

COMMENT: In 1965 a microfossil present in small numbers in the Dartmoor Formation, Victoria, was referred by Cookson and Eisenack, to the microplankton genus *Baltisphaeridium*. Later, upon receipt of a paper by McIntyre (1965) on some New Zealand Tertiary pollen grains, it was found that an apparently comparable type had been previously described as a monosulcate pollen grain under the name *Monosulcites prominatus*. This fact is of particular interest in the present connection since a form similar to the one from the Dartmoor Formation has occurred regularly in the Esso T27 sample from Strahan, Tasmania. In all but one of the Strahan examples, as in those from the Dartmoor Formation and the two specimens of *M. prominatus* figured by McIntyre, the wall of one surface has been partially or completely missing. In this complete Strahan example (Pl. 18, fig. 8) one surface shows a relatively narrow, clearly defined, oval opening resembling a sulcus, thereby giving a clear indication that specimens of this type whether complete or incomplete, or circular or oval in outline, represent monosulcate pollen grains referable to the form genus *Monosulcites*.

A detailed study has shown that the exinous appendages are solid, variable in shape, usually narrowing from the base towards a bluntly pointed apex and occasionally, as in the New Zealand examples, slightly constricted at the point of attachment. The exine is distinctly, though very finely, reticulate (Pl. 18, fig. 12), not granular as was stated in the earlier description (Cookson & Eisenack 1965, p. 137) and the muri are probably discretely baculate. It seems likely that the reticulum is below the surface, *i.e.* the wall of the whole object is tectate.

Examination of a specimen of *M. prominatus* recently generously supplied by Dr W. F. Harris of New Zealand has strengthened the belief that the Australian and New Zealand forms are generically, and probably specifically, identical.

DIMENSIONS: Complete example, overall *c.* 64 × 52 μ, appendages *c.* 5-9 μ long.

A thorough examination of the pollen and spore content of the Esso Exploration Australia, Inc. sample T27 under consideration has not been possible at this time. However, a few of the more readily recognizable forms are recorded and illustrated in Plate 21 for comparison with similar types recently discussed by Harris (1965) in his detailed work on 'Basal Tertiary Microfloras from the Princetown Area, Victoria, Australia'.

The pollen and spore content of sample T27 has varied considerably in amount, according to the nature of the matrices treated, being lowest in the type with the richest microplankton content. The types considered and illustrated in Plate 21 are: *Cyathidites* sp. (fig. 1) of occasional occurrence; *Podocarpidites ellipticus* Cookson (fig. 2) numerous; *Phyllocladidites mawsoni* Cookson (fig. 3, 4) and *Microcachryidites antarcticus* Cookson (fig. 5), both of fairly frequent occurrence; *Tricolpites gillii* Cookson (fig. 6) occasional; *Tiliaepollenites notabilis* Harris (fig. 7) of regular occurrence in small numbers; *Polyporina fragilis* Harris (fig. 8) of regular occurrence; *Banksieidites* sp. (fig. 9) infrequent; cf. *Diporites* sp. Harris (fig. 10) infrequent; *Anacolosidites luteoides* Cookson & Pike (fig. 11) only the figured specimen observed; *Nothofagidites brachyspinulosa* (Cookson) and *N. emarcida* (Cookson) (fig. 12, 15) of regular occurrence but never numerous; *Proteacidites* cf. *dilwynensis* Harris (fig. 13) and *Proteacidites ornatus* Harris (fig. 14) in small numbers; *'Ephedra' notensis* Cookson 1957 of uncertain affinity in small numbers.

COMMENT: The occurrence of such forms as *Podocarpidites ellipticus, Tricolpites gillii, Tiliaepollenites notabilis* and *'Ephedra' notensis*, all of which appear, from previous investigations of Victorian Tertiary sediments, to be of Paleocene age, supports the suggestion made earlier (p. 137) that the age of the Strahan sample is Paleocene and probably comparable with that of the upper portion of the Dilwyn Clay (Harris 1965, p. 2).

In this connection the apparent absence from the Strahan sample of two distinctive early Tertiary pollen types, namely *Triorites edwardsii* Cookson & Pike 1954 and *Proteacidites pachypolus* Cookson & Pike 1954, both of which were regarded by Cookson (1954) as of stratigraphical value, is of interest. Harris (*loc. cit.*) has recorded *T. edwardsii* from the Pebble Point Formation and *P. pachypolus* from the upper portion of the Dilwyn Clay, namely the Princetown Member. The association of *Tricolpites gillii* and *'Ephedra' notensis*, both of which are components of the Strahan microflora, with *Triorites edwardsii* in freshwater deposits near Launceston and Evandale in northern Tasmania, believed to be of Paleocene age (Gill 1962, p. 226), is of some significance.

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Explanation of Plates

Unless otherwise stated the figures are of specimens from Esso Exploration Australia, Inc. Sample T27, Strahan, Tasmania.

PLATE 17

FIG. 1—*Wetzeliella lineidentata* Deflandre & Cookson, (P24732) × *c.* 256.
FIG. 2—*Wetzeliella* cf. *lineidentata* (P24733) × *c.* 460.

FIG. 3, 4—*Wetzeliella* cf. *articulata* Eisenack (P24734, 24735) × *c.* 460.
FIG. 5, 6—*Wetzeliella homomorpha* Deflandre (P24736, 24737) showing archeopyle × *c.* 650.
FIG. 7—*Diphyes colligerum* Cookson (P24738) × *c.* 650.

PLATE 18

FIG. 1-5—*Kenleyia lophophora* Cookson & Eisenack (P24739-24743) showing wide morphological variation × *c.* 650.
FIG. 6—*K. lophophora* showing two-layered character of wall × *c.* 1,000.
FIG. 7—*K. lophophora* (P24744) from the type locality Dartmoor Formation, Victoria × *c.* 550.
FIG. 8-12—*Monosulcites prominatus* McIntyre (P24745-24748), 8-10 × *c.* 650; 11, 12 an example from the Rivernook Member of Dilwyn Clay, Victoria; 11, exine in optical section × *c.* 1,400; 12, reticulum in surface view × *c.* 2,000.

PLATE 19

FIG. 1-8—*Spinidinium essoi* n.sp. 1, 2, (P24753) ventral and dorsal surfaces of holotype × *c.* 650: 3, 4 (P24753, 24754) ventral surface of two examples × *c.* 650; 5, dorsal surface (P24756) × *c.* 650; 6, 7 (P24757) ventral surface of two examples × *c.* 650; 8 (P24758) ventral surface of specimen containing a cyst-like body × *c.* 650.
FIG. 9-11—*Cyclonephelium variabilis* n. sp. 9, holotype (P24749) × *c.* 650; 10, 11, ventral surface of two specimens (P24750, 24751) × *c.* 650.
FIG. 12—*Cordosphaeridium inodes* (Klumpp) × *c.* 650.
FIG. 13—*Leiosphaeridia trematophora* n. sp. (P24752) holotype × *c.* 650.

PLATE 20

All the figures are of *Homotryblium tasmaniense* n. sp. Fig. 1-9 are at a magnification of *c.* 650.

FIG. 1, 2—Two views of the holotype (P24727).
FIG. 3—Specimen showing delimitation and partial separation of plate-like areas on one surface (P24728).
FIG. 4, 5—Two views of the same specimen. 4, surface from which all but two of the plate-like areas have been completely removed (P24729).
FIG. 6—An example with short appendages.
FIG. 7—Specimen showing surface features and a particularly large appendage (P24727).
FIG. 8—Specimen showing complete removal of one surface, and detached plate-like area (P24730).
FIG. 9—Specimen showing an early stage in the delimitation of the plate-like areas (P24731).
FIG. 10—A portion of the shell wall showing the rod-like elements × *c.* 1,500.

PLATE 21

All figures are at a magnification of *c.* 650.

FIG. 1—*Cyathidites* sp.
FIG. 2—*Podocarpidites ellipticus* Cookson.
FIG. 3, 4—*Phyllocladidites mawsoni* Cookson.
FIG. 5—*Microcachryidites antarcticus* Cookson.
FIG. 6—*Tricolpites gillii* Cookson.
FIG. 7—*Tiliaepollenites notabilis* Harris.
FIG. 8—*Polyporina fragilis* Harris.
FIG. 9—*Banksieidites* sp.
FIG. 10—cf. *Diporites* sp. Harris.
FIG. 11—*Anacolosidites luteoides* Cookson & Pike
FIG. 12—*Nothofagidites brachyspinulosa* Cookson.
FIG. 13—*Proteacidites* cf. *dilwynensis* Harris.
FIG. 14—*Proteacidites ornatus* Harris.
FIG. 15—*Nothofagidites emarcida* Cookson.
FIG. 16—'*Ephedra*' *notensis* Cookson.